

# इंटरनेट

# मानक

## Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 12007 (1987): Laminated Collapsible Tubes [PCD 21: Plastics Containers]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



BLANK PAGE



**IS : 12007 - 1987**

*Indian Standard*

**SPECIFICATION FOR  
LAMINATED COLLAPSIBLE TUBES**

UDC 621.798 166.419

© Copyright 1987

**BUREAU OF INDIAN STANDARDS**  
**MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG**  
**NEW DELHI 110002**

**AMENDMENT NO. 1 JUNE 2003  
TO  
IS 12007 : 1987 SPECIFICATION FOR LAMINATED  
COLLAPSIBLE TUBES**

( *Page 3, Foreword, clause 0.3* ) — Insert the following new clause after 0.3 and renumber the subsequent clause:

'0.4 A scheme of labelling environment friendly products with the ECO logo has been introduced at the instance of the Ministry of Environment and Forests (MEF), Government of India. The ECO-Mark is being administered by the Bureau of Indian Standards (BIS) under the *BIS Act*, 1986 as per the Resolutions No. 71 dated 21 February 1991 and No. 425 dated 28 October 1992 published in the Gazette of the Government of India. For a product to be eligible for marking with the ECO logo, it shall also carry the ISI Mark of the BIS besides meeting additional environment friendly requirements. For this purpose the Standard Mark would be a single mark being a combination of the ISI Mark and the ECO logo.

This amendment is based on the gazette Notification No. 170 dated 18 May 1996 for plastic products as environment friendly products published in the Gazette of the Government of India. This amendment is, therefore, being issued to this standard to include environment friendly requirements for laminated collapsible tubes'.

( *Page 12, clause 7.1.1* ) — Insert the following new clauses after 7.1.1 and renumber the subsequent clauses:

**'8 ADDITIONAL REQUIREMENTS FOR ECO-MARK**

**8.1 General Requirements**

**8.1.1** The product shall conform to the requirements for quality, safety and performance prescribed.

**8.1.2** The manufacturer shall produce to BIS the consent clearance as per the provisions of *Water (Prevention & Control of Pollution) Act*, 1974 and *Air (Prevention & Control of Pollution) Act*, 1981 along with the authorization, if required under *Environment (Protection) Act*, 1986 and the Rules made thereunder while applying for the ECO-Mark. The manufacturers of plastic wares shall produce documentary evidence with respect to the compliance of regulation under *Drugs and Cosmetic Act*, 1940 and the Rules made thereunder, wherever necessary.

## **Amend No. 1 to IS 12007 : 1987**

**8.1.3** The product must display a list of critical ingredients in descending order of quantity present expressed as percent of the total. The list of such ingredients shall be identified by Bureau of Indian Standards.

**8.1.4** The product packaging shall display in brief the criteria based on which the product has been labelled as 'Environment Friendly'.

**8.1.5** The material used for product packaging shall be recyclable or biodegradable.

**8.1.6** It shall also suitably mention that ECO-Mark label is applicable only to the packaging material/package, if content is not separately covered under ECO-Mark. It may be stated that ECO-Mark is applicable to the product or packaging material or both.

### **8.2 Product Specific Requirements**

The plastic products shall apart from fillers and reinforcing agents, be made from the minimum of 90 percent, by weight of compatible plastic wastes.

NOTE — The manufacturer shall provide documentary evidence by way of certificate or declaration to this effect.'

(PCD 21)

# Indian Standard

## SPECIFICATION FOR LAMINATED COLLAPSIBLE TUBES

Plastics Containers Sectional Committee, MCPD 11

*Chairman*

**SRI A. S. ATHALYE**

*Representing*

**Technology Transfer, Bombay**

*Members*

**SRI C. D. ANAND**

**Directorate General of Technical Development,  
New Delhi**

**SRI M. BALAN**

**All India Food Preservers' Association ( Regd ),  
New Delhi**

**SRI S. VASUDEVAN ( Alternate )  
DR I. S. BHARDWAJ**

**Central Institute of Plastics Engineering & Tools,  
Madras**

**DR K. RAMAMURTHY ( Alternate )  
DR B. P. CHANDRASEKHAR**

**Pesticides Association of India, New Delhi  
Union Carbide India Ltd, Calcutta**

**SRI P. A. DANDEKAR  
SRI V. SHANKAR ( Alternate )**

**Polyolefins Industries Ltd, Thane**

**SRI V. DORAIRAJ  
SRI R. G. PINGE ( Alternate )**

**BASF India Limited, Bombay**

**SRI R. N. GANJOO  
SRI B. JOSHI ( Alternate )**

**Polychems Limited, Bombay**

**SRI S. S. JHAVERI  
SRI K. G. ZAVERI ( Alternate )**

**Bright Brothers Limited, Bombay**

**SRI A. H. KHAN  
SRI I. G. ADVANI ( Alternate )**

**Metal Box India Limited, Calcutta**

**DR S. LAKSHMANAN  
SRI O. BANERJEE ( Alternate )**

**Commissioner of Food & Drug Administration,  
Bombay**

**SRI B. C. MEHTA**

**SRI V. C. SANE ( Alternate )  
SRI V. S. MUNGE**

**Gujarat State Fertilizers Co Ltd, Dist  
Vadodara**

**SRI P. V. NARAYANAN  
SRI H. R. IYER ( Alternate )**

**Indian Institute of Packaging, Bombay**

**SRI M. PARTHASARATHY**

**Polyene Film Industries Pvt Ltd, Madras**

**SRI A. K. MUKHERJEE ( Alternate )**

( Continued on page 2 )

© Copyright 1987

BUREAU OF INDIAN STANDARDS

This publication is protected under the *Indian Copyright Act ( XIV of 1957 )* and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

**IS : 12007 - 1987**

*( Continued from page 1 )*

<i>Members</i>	<i>Representing</i>
SHRI M. B. SINGH	Ministry of Defence ( R&D )
SHRI ANIL AGARWAL ( <i>Alternate</i> )	
SECRETARY	Central Committee for Food Standards ( DGHS ), New Delhi
SHRIMATI DEBI MUKHERJEE ( <i>Alternate</i> )	
SHRI J. K. VADODARIA	National Organic Chemical Industries Ltd, Bombay
SHRI O. ATHAIDE ( <i>Alternate</i> )	
SHRI P. VEEBRAJU	Central Food Technological Research Institute, Mysore
SHRI N. BALASUBRAMANYAN ( <i>Alternate</i> )	
SHRI E. R. VIOGAJEE	Warden & Co ( India ) Pvt Ltd, Bombay
SHRI F. M. DIAS ( <i>Alternate</i> )	
SHRI B. L. RAJNA, Director ( MCPD )	Director General, BIS ( <i>Ex-officio Member</i> )

*Secretary*

SHRI A. R. GULATI  
Joint Director ( MCPD ), BIS



# *Indian Standard*

## SPECIFICATION FOR LAMINATED COLLAPSIBLE TUBES

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 11 March 1987, after the draft finalized by the Plastics Containers Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

**0.2** Plastics laminated tubes are a recent entry in collapsible tube packaging and it provides packing media for many of the formulations, such as toothpastes, cosmetics, medicinal creams, and adhesives.

**0.3** Under the provision of Standard of Weights and Measures ( Packaging Commodity ) Rules, 1977 the collapsible tubes are required to be filled in with fixed masses of product packed. With the variation in the specific gravity of different products it has not been possible to specify the length of the tubes. It will depend on the basis of volume calculated for different masses of the product to be packed and will therefore be specified by the purchaser.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

---

### 1. SCOPE

**1.1** This standard prescribes the dimensions, performance and testing requirements of fully collapsible multi-laminated plastics tubes with caps.

### 2. TERMINOLOGY

**2.0** For the purpose of this standard, the following definitions, as illustrated in Fig. 1, 2 and 3, shall apply.

---

\*Rules for rounding off numerical values ( revised ).

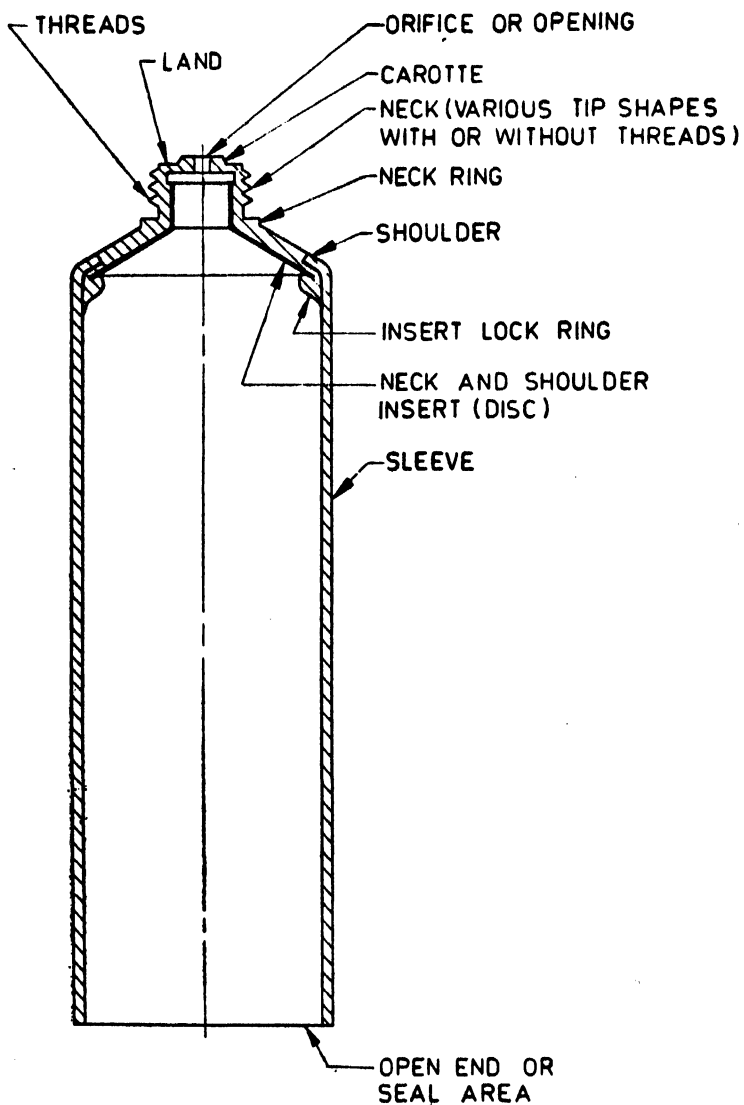


FIG. 1 BASIC LAMINATED TUBE NOMENCLATURE

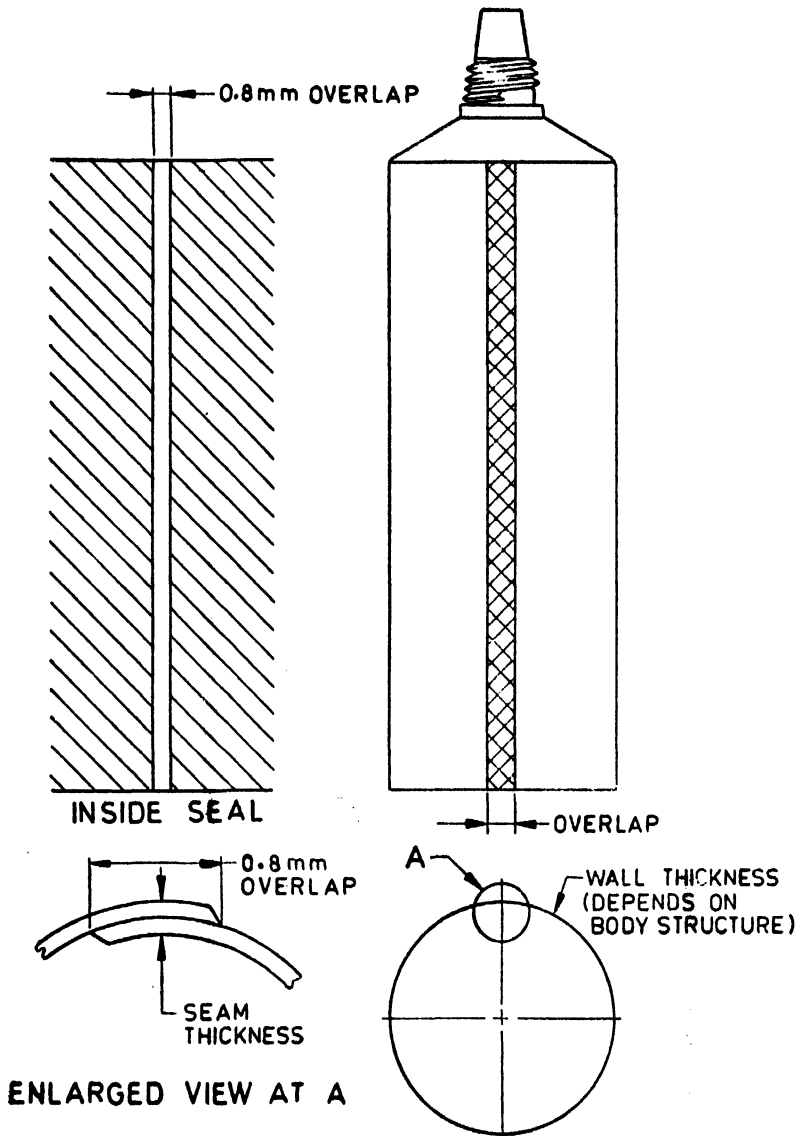


FIG. 2 DETAIL OF BODY SEAM

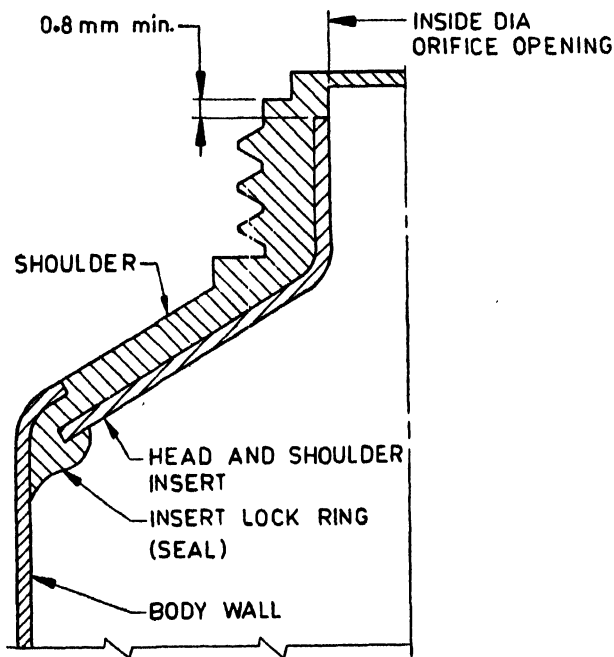


FIG. 3 HEAD AND SHOULDER INSERT LOCATION

**2.1 Sleeve** — Formed laminated web roll stock cut to a specific length and size; also called body.

**2.2 Body Wall Thickness** — Caliper thickness of laminated material.

**2.3 Side Seam** — Formed by radio frequency energy sealing under pressure of the outer and inner plastic layers that are overlapped.

**2.4 RF Seaming** — Seaming by radio frequency.

**2.5 Shoulder** — That portion of tube which integrates the neck section to the body.

**2.6 Head Insert** — A disc with a short neck, shaped to fit within the polyethylene shoulder and neck of the finished tube. It is made of urea formaldehyde or poly butalene-terephthalate (PBT) and acts as a barrier between the product and the shoulder and neck of the tube.

**2.7 Insert Lock Ring** — The portion of head material which acts as a lock or sealing ring to the shoulder insert preventing it from pulling away from the shoulder and also acts as seal around the lip of the insert to prevent leakage of product between the shoulder insert and the plastic headed shoulder material thus preventing a permeating problem.

**2.8 Land** — Flat sealing surface on top of neck.

**2.9 Neck Ring** — An integrally moulded portion of the shoulder commonly seen as a ring at the bottom of the neck section.

**2.10 Threads** — An integrally moulded portion of the neck of screw type design to enable cap or closure to be fitted to tube.

**2.11 Neck** — The portion of the tube between the shoulder and the land or the top of the sealing surface.

**2.12 Tip** — Uppermost integral part of the neck.

**2.13 Carotte** — Portion of excess material left on the tube neck terminating at the orifice opening and trimmed off prior to capping.

**2.14 Orifice** — Opening in the neck section through which the product is dispensed.

**2.15 Print** — May be done by a suitable printing process.

**2.16 Code Data** — A series of letters and numbers imprinted into the sleeve at the seamer to identify exact date of manufacturing and line. Appears in the area of the tube between the seam and front panel copy. Valuable information to isolate production if needed.

**2.17 Electric Eye Mark** — The most commonly used is the square or rectangular shape, located near the open end or bottom of the tube for purpose of print orientation for sealing the bottom and to center the face or front panel. Also used for controlling the print position in relation to the cut length of the sleeve.

**2.18 End Seal Area** — At the open end of the tube which is sealed after being filled with the product.

**2.19 Head Space** — Refers to the length of the tube above the product fill before sealing, required to assure no contamination of the seal area by the product during sealing and also includes enough space for actual seal.

**2.20 Cop** — Moulded closure that is applied to neck of the tube.

**2.21 Tube** — Referred to as finished product.

**2.22 Rondelle** — An aluminium foil laminate embedded inside the shoulder to prevent flavour loss and to give enhanced shelf life.

### **3. MATERIAL**

**3.1 Tube** — The tube shall be manufactured from laminates, which may comprise of three or more layers of various types of substrates for example, LDPE, aluminium foil, paper laminate or any other possible combinations.

**3.1.1 Laminate Web Construction** — Laminate web comprising three or more layers which may consist of various substrates like aluminium foil, paper and other thermoplastics. Each substrate having its own properties. As such the layers directly in contact with the contents shall be compatible with the product to be packed which shall be decided after assessing the physical and chemical properties of product. Therefore, the laminate structure shall be decided by the buyer and seller suiting the application.

**3.2 Caps** — The caps may be made from moulding grade LDPE or HDPE, polypropylene or any other thermoplastics. The moulding pigments shall not be toxic and shall be compatible with the product packed.

**3.3 Insert** — The insert if required may be made from a suitable non-toxic plastics material.

**3.4 Rondelle** — The rondelles made of aluminium foil laminate of thickness as specified by the purchaser may be provided.

### **4. SHOULDER AND NOZZLE DIMENSIONS**

**4.1** Recommended dimensions of the shoulder and the nozzle for different diameters of tubes are given in Fig. 4. Length of the tubes shall depend on the mass and bulk density of the product to be packed ( *see 0.3* ).

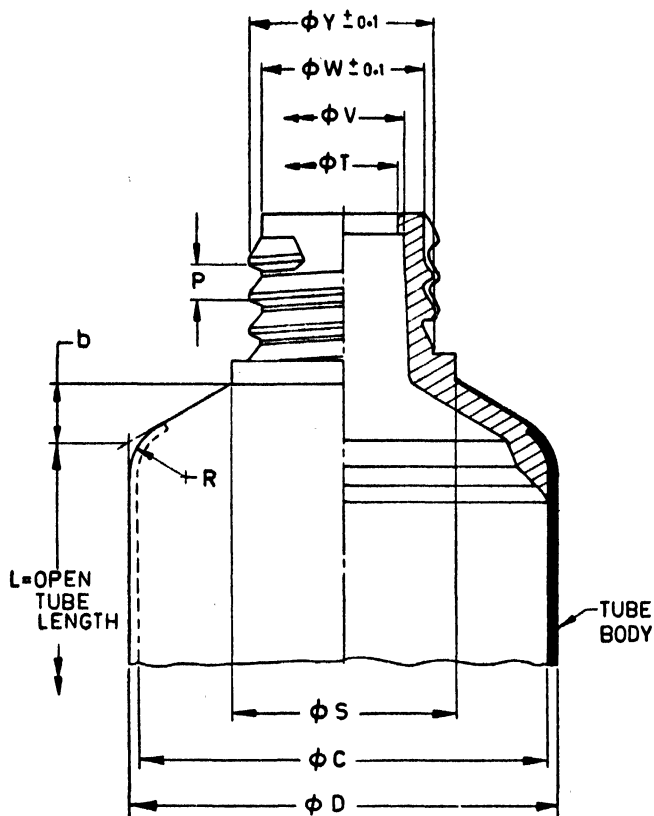
**4.2 Tube Capacity** — The capacity shall be specified in volume (ml) or nett mass (g) of the contents to be packed.

### **5. TESTING**

**5.1 Visual Defects** — The finished tubes shall be examined visually for the following defects:

#### **5.1.1 Critical Defects:**

- a) Incorrect print design or colour;
- b) Insect, hair, or other gross contamination on/in tube or cap;
- c) Open seam;



<i>Dia</i> <i>D</i>	<i>C</i>	<i>T</i>	<i>b</i>	<i>R</i>	<i>P</i>	<i>V</i>	<i>W</i>	<i>T</i>	<i>S</i>
22.2	21.15	5.5	3.20	3.0	1.8	6.3	8.18	9.47	11.2
27.0	26.30	6.8	4.00	3.0	1.8	6.8	9.45	11.10	12.7
30.0	29.30	6.8	4.85	3.5	1.8	6.8	9.45	11.10	12.7
31.8	31.05	6.8	5.35	3.5	1.8	6.8	9.45	11.10	12.7
35.0	34.30	8.0	5.72	4.0	2.1	10.4	12.35	14.00	15.2

All dimensions in millimetres.

FIG. 4 DIMENSIONS FOR TUBE AND NOZZLE

- d) Gross foil exposure;
- e) Open shoulder weld;
- f) Hole or slit in tube or sleeve;
- g) Incomplete head;
- h) Blocked orifice, and
- j) Stripped threads.

**5.1.2 Other Defects:**

- a) Delamination;
- b) Seam white line barely visible;
- c) Seam melted on outside to point where the outer layers of polyethylene are pulled off or wrinkled;
- d) Damaged ends;
- e) Missing, cracked or badly chipped insert;
- f) Flashing or pigtails in the orifice;
- g) Poly strings inside or attached to tube;
- h) Inside contamination; and
- j) Outside contamination.

**5.2 Leakage Test** — The capped tube when tested by air at a pressure of 30 kPa shall not show any leakage in the area around the cap and shoulder. The details of the method are given in Appendix A.

**5.3 Bursting Test** — The tube shall not burst at the side seam or the end seal when tested to bursting by applying air pressure as per the method given in Appendix B.

**5.4 Bond Strength Between Extruded Head and Sleeve** — The bond strength between the extruded head and the sleeve, when tested as per the method detailed in Appendix C, shall be good.

**5.5 Inside Diameter of Tubes** — Inside diameter of the tubes shall be determined by the method given in Appendix D.

**5.6 Outside Tubes Diameter** — Shall be checked by Go/No Go gauges as per the method given in Appendix E.

**5.7 Copper Sulphate Test for Determination of Exposed Aluminium in Tubes** — The tube when tested for any exposed aluminium surface by the method given in Appendix F shall not show any brownish or red deposit on the surface.



**5.8 End Seal Integrity Test** — The end seal when tested as per the method given in Appendix G shall be good.

**5.9 Water Leakage Test** — Tubes shall be filled with water and allowed to stand for 12 hours. There shall be no leakage. A water soluble coloured dye may be added to the water to aid identification of the leak path.

**5.10 External Decoration Test** — Tubes shall be immersed for 24 hours at room temperature in a slurry of 10 percent of the relevant product in water.

Only slight fading, lifting or softening of print shall be acceptable.

**5.11 Product Compatibility Test** — The compatibility of the tube material with the product to be packed into it shall be tested by the method given in Appendix H.

**5.12 Extraction Test for Laminated Tubes for Packing Tooth-pastes** — The tubes to be used for packing of toothpastes shall be subjected to extraction test with demineralized distilled water as per the method detailed in Appendix J. The extractives shall not exceed 50 parts per million or 0.078 mg/cm<sup>2</sup>.

## 6. SAMPLING

**6.1 Lot** — The tubes manufactured from the same raw material and of the same dimensions manufactured under similar conditions shall constitute a lot.

**6.2 Scale of Sampling** — To ascertain the conformity of the lot to the requirements of the standard, tests shall be carried out for each lot separately. The number of tubes to be sampled from a lot shall be in accordance with Table 1.

**6.3** The tube shall be selected at random from the lot and in order to ensure the randomness of selection, procedures given in IS : 4905-1968\* may be followed.

## 7. INFORMATION TO BE SUPPLIED BY THE PURCHASER

**7.1** When specifying the laminated collapsible tubes the requirements shall be stated in the following order:

- a) Diameter,
- b) Length, and
- c) Orifice or nozzle diameter.

---

\*Methods for random sampling.

**TABLE 1 SCALE OF SAMPLING AND ACCEPTANCE NUMBER**  
( Clause 6.2 )

LOT SIZE	SAMPLE SIZE	ACCEPTANCE No.	REJECTION No.
(1)	(2)	(3)	(4)
Up to 1 000	32	3	1
1 001 „ 3 000	50	5	2
3 001 „ 10 000	80	7	3
10 001 „ 35 000	125	10	5
35 001 and above	200	14	7

**7.1.1** Full details of the caps used shall also be given.

## **8. PACKING AND MARKING**

**8.1 Packing** — The tubes may be supplied in clean fibreboard or wooden cases with or without dividers.

**8.2 Marking** — The tubes shall be marked with the manufacturer's name, initials or recognized trade-mark and year of manufacture and any other information as required by the purchaser.

**8.2.1** The tubes may also be marked with the Standard Mark.

**NOTE** — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986, and the Rules and Regulations made there-under. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. BIS marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

## **APPENDIX A**

( Clause 5.2 )

### **LEAKAGE TEST FOR LAMINATED TUBES**

#### **A-1. APPARATUS**

- a) Air gun attached to 30 kPa supply,
- b) Soft rubber cone fitted to air gun nozzle, and
- c) Container for water.

## **A-2. PROCEDURE**

Insert the soft rubber cone into the open end of the tube.

Immerse the capped end of the tube into the water filled container.

Press the trigger valve on the air gun applying pressure to the tube.

Look for air bubbles in the area around the cap and shoulder.

## **A-3. OBSERVATIONS**

**A-3.1** If bubbles appear, visually examine the tube and determine the cause.

# **A P P E N D I X B**

( *Clause 5.3* )

## **BURSTING TEST**

### **B-1. PROCEDURE**

**B-1.1** Seal the open end of the empty tube.

**B-1.2** Remove the cap and connect the nozzle with appropriate neck-fittment to air supply line.

**B-1.3** Apply air pressure to the tube at the rate of 70 kPa per 5 seconds and continue raising the pressure till the pressure reaches 140 kPa.

**B-1.4** Maintain this pressure for 15 seconds. The tube or seal shall not show any bursting at the body or seals.

**B-1.5** Raise the pressure further till the tube bursts. Observe the rupture of the tube. The tube passes the test if the body ruptures before the seal fails.

# **A P P E N D I X C**

( *Clause 5.4* )

## **BOND STRENGTH TEST FOR EXTRUDED AND SLEEVE**

### **C-1. PROCEDURE**

**C-1.1** Look at bond visually to determine if there is any obvious sleeve to head separation at the shoulder.

**C-1.2** Cut the sleeve into approximately 15 mm strips terminating the cut at the shoulder.

**C-1.3** Holding the head in one hand and a strip in the other, separate the strip from the head.

**C-1.4** Angle of 90° should be maintained between strip and the axis of the tube.

**C-1.5** Rate bonds according to the following:

- a) Good — hard to pull, structural material tears;
- b) Marginal — easy to pull, slight tearing of structural materials;  
and
- c) Poor — easy to pull, no tearing of structural materials.

## **A P P E N D I X D**

*( Clause 5.5 )*

### **MEASUREMENTS OF INSIDE DIAMETER OF TUBE**

**D-1. Apparatus** — Mandrel of appropriate diameter for the tube size being tested.

#### **D-2. PROCEDURE**

**D-2.1** Push the tube or sleeve over the mandrel and not the amount of force or pressure necessary.

**D-2.2** Observe if the tube or sleeve fits too tight or loose over the mandrel.

#### **D-3. OBSERVATION**

**D-3.1** For laminated tubes or sleeves there should be some frictional resistance, but not enough to buckle the wall. The fit should not be loose.

## **A P P E N D I X E**

*( Clause 5.6 )*

### **METHOD OF MEASUREMENT OF OUTSIDE DIAMETER OF TUBE**

**E-1. PRINCIPLE** — This method accurately determines the outside tube diameter using a Go/No Go gauge.

## **E-2. PROCEDURE**

**E-2.1** Push sample through the correct hole diameter on the gauge.

**E-2.2** The tube should fit through the gauge with a small amount of effort. A no fit or extreme effort fit indicates that the tube does not meet specification.

## **A P P E N D I X F**

( *Clause 5.7* )

### **COPPER SULPHATE TEST FOR DETERMINATION OF EXPOSED ALUMINIUM IN TUBES**

**F-1. REAGENTS** — Laminate test solution ( 20 percent copper sulphate solution ).

## **F-2. PROCEDURE**

**F-2.1** Fill the capped tube with appropriate copper sulphate solution to within 25 mm of the open end.

**F-2.2** Place the tube in the support stand clamp and allow it to stand for 1 min.

**F-2.3** Pour copper sulphate solution from the tube into test solution container.

**F-2.4** Test solution should be replaced every two months.

**F-2.5** Rinse the tube with tap water.

**F-2.6** Cut the tube parallel with side seam and carefully examine the inside of the tube for a brownish red deposit.

**F-2.7** Brownish, red deposit indicates exposed aluminium.

## **A P P E N D I X G**

( *Clause 5.8* )

### **END SEAL INTEGRITY TEST**

## **G-1. PROCEDURE**

**G-1.1** Cut the sealed empty tube at least 50 mm below the seal.

**G-1.2** Make two parallel cuts perpendicular to the seal at the corner of the seal.

**G-1.3** Pull both strips until the sample fails.

**G-1.3.1** If the seal is good, it will fail by fracturing the laminate, while the sealed interface remains unchanged. If the seal opens up by the pull the sealing is improper. A break should occur at the base of the seal next to the tube body or elsewhere in the body to ensure a good seal.

## **APPENDIX H**

*( Clause 5.11 )*

### **PRODUCT COMPATIBILITY TEST**

#### **H-1. PRINCIPLE**

**H-1.1** The tube is brought in contact with the product to be packed and maintained at a fixed temperature and time. The tube is visually examined for any damage. With this test, a suitable control test in a stoppered neutral glass test tube may be carried out simultaneously.

#### **H-2. PROCEDURE**

**H-2.1** Take ten tubes for testing. Fill the product in tightly stoppered tubes. Seal the open end of the tubes properly. Subject these tubes to 45°C in an oven for a period of 72 hours. After this period the tubes are allowed to cool to room temperature and then are carefully cut open lengthwise.

#### **H-3. PRODUCT COMPATIBILITY**

**H-3.1** The contents of the tube should not show any discolouration, change in odour, gas formation or signs of decomposition compared to control sample kept in the sealed neutral glass test tube and subjected to identical conditions at the same time.

#### **H-4. TUBE COMPATIBILITY**

**H-4.1** After the observation as above is recorded, the contents are washed from the spread open tube body with water at about 45°C. The tube is dried with cotton wool avoiding rubbing and scratching.

#### **H-5. REQUIREMENT**

**H-5.1** There shall be no visible signs of softening with scratching, blistering or delamination when the surface is examined in each tube.

**NOTE** — The test given is primarily meant to detect only gross incompatibility of tube material. The manufacturer and the purchaser are advised to conduct long term storage trials to examine the compatibility of the product with the tube material in a more realistic manner.

## APPENDIX J

( Clause 5.12 )

### METHOD OF EXTRACTION TEST FOR LAMINATED TUBES INTENDED FOR PACKING TOOTHPASTE

#### J-1. PRINCIPLE

**J-1.1** The tube is filled with warm demineralized distilled water at  $50 \pm 2^\circ\text{C}$  and maintained at that temperature for 24 hours. At the end of this period, the extractives in the water are determined by evaporating it to dryness.

#### J-2. METHOD

**J-2.1** Testing of the tubes should be done in quadruplicate and each replicate should have an area of about 1 200 cm<sup>2</sup>.

**J-2.2** The tubes should be cleaned thoroughly using hot water at about  $90^\circ\text{C}$  using preferably a water jet. Drain the water and dry the tubes.

**J-2.3** Preheat demineralized distilled water to  $50^\circ\text{C}$  in a Pyrex flask. Fill the tubes to 5 mm from the top with a measured volume of  $50^\circ\text{C}$  water. Cover with clean aluminium foil or cap. Place the tubes in an incubator or oven maintained at  $50^\circ\text{C}$ . After 24 hours remove the tubes and immediately composite the water of each replicate in a Pyrex beaker.

**J-2.4** Evaporate the water to about 100 ml on a low temperature hot plate and transfer to a clean tared platinum dish, washing the beaker 3 times with hot water and evaporate to a few ml on a low temperature hot plate. The last few millilitres should be evaporated in an oven maintained at  $100^\circ\text{C}$ . Cool the platinum dish in a desiccator for 30 minutes and weigh the residue to nearest 0.1 mg/cm<sup>2</sup> and in parts per million ( ppm ) for the size of the tube.

#### J-3. CALCULATION

$$\text{a) Milligram extractives/cm}^2 = \frac{e}{s}$$

$$\text{b) Extractives residue ( ppm ) } Ex = \frac{(e) (a) (1\,000)}{(c) (s)}$$

where

$Ex$  = extractive residue in ppm for any container size;

$e$  = milligram extractives per sample tested;

$a$  = total coated area, including closure, in  $\text{cm}^2$ ;

$c$  = water capacity of container in g; and

$s$  = surface of coated area tested in  $\text{cm}^2$ .

**J-4. RESULTS** — Using the above equations, the concentration of extractives residue ( $Ex$ ) should not exceed  $0.078 \text{ mg/cm}^2$  of product contacting surface or 50 parts per million of the water capacity of the container.



# BUREAU OF INDIAN STANDARDS

## *Headquarters:*

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones: 3 31 01 31, 3 31 13 75

Telegrams: Manaksanstha  
( Common to all Offices )

## *Regional Offices:*

\*Western : Manakalaya, E9 MIDC, Marol, Andheri ( East ), 6 32 92 95  
BOMBAY 400093

†Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, 36 24 99  
Maniktola, CALCUTTA 700054

Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036 { 2 18 43  
3 16 41

Southern : C. I. T. Campus, MADRAS 600113 { 41 24 42  
41 25 19  
41 29 16

## *Branch Offices :*

'Pushpak', Nurmohamed Shaikh Marg, Khanpur, { 2 63 48  
AHMADABAD 380001 { 2 63 49

'F' Block, Unity Bldg, Narasimharaja Square, 22 48 05  
BANGALORE 560002

Gangotri Complex, 5th Floor, Bhadbhada Road, T. T. Nagar, 6 67 16  
BHOPAL 462003

Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002 5 36 27  
53/5, Ward No. 29, R. G. Barua Road, 5th Byelane  
GUWAHATI 781003 —

5-8-56C L. N. Gupta Marg ( Nampally Station Road ), 23 10 83  
HYDERABAD 500001

R14 Yudhister Marg, C Scheme, JAIPUR 302005 { 6 34 71  
6 34 32

117/418 B Sarvodaya Nagar, KANPUR 208005 { 21 68 76  
21 82 92

Patilputra Industrial Estate, PATNA 800013 6 23 05

Hantex Bldg ( 2nd Floor ), Railway Station Road, 7 66 37  
TRIVANDRUM 695001

## *Inspection Offices ( With Sale Point ):*

Pushpanjali, 205A West High Court Road, 2 51 71  
Bharampeth Extension, NAGPUR 440010

Institution of Engineers ( India ) Building, 1332 Shivaji Nagar, 5 24 35  
PUNE 411005

\*Sales Office in Bombay is at Novelty Chambers, Grant Road, 89 45 28  
Bombay 400007

†Sales Office in Calcutta is at 5 Chowringhee Approach, P. O. Princep 27 68 00  
Street, Calcutta 700072